

What is claimed is:

[Claim 1] 1. A method of responding to an anomalous change in downhole pressure in a bore hole comprising:

detecting the anomalous change in downhole pressure at a first location along a segmented electromagnetic transmission path integrated into the tool string;

sending a signal along the segmented electromagnetic transmission path; receiving the signal by at least one receiver in communication with the segmented electromagnetic transmission path; and

performing an automated response at a second location along the drill string.

[Claim 2] 2. The method of claim 1 wherein the anomalous change in downhole pressure is selected from the group consisting of a pressure kick, a blowout, and loss of circulation.

[Claim 3] 3. The method of claim 1 wherein the anomalous change in downhole pressure is detected by at least one pressure sensor associated with nodes, integrated tools, non-integrated tools, or bottom-hole assemblies.

[Claim 4] 4. The method of claim 3 wherein the at least one downhole pressure sensor is located near the bottom of the downhole tool string.

[Claim 5] 5. The method of claim 1 wherein the at least one receiver is selected from the group consisting of a blowout preventor, a drilling fluid flow regulator, a computer, a router, a node, an actuator, and an alarm.

[Claim 6] 6. The method of claim 1 wherein the automated response is selected from the group consisting of actuating a blowout preventor, adjusting the flow of drilling fluid, and broadcasting an alarm.

[Claim 7] 7. The method of claim 1 wherein the automated response is performed immediately upon receiving the signal.

[Claim 8] 8. The method of claim 1 wherein the automated response is performed by the receiver.

[Claim 9] 9. The method of claim 1 wherein the method further comprises the step of actuating an action performing device by the receiver.

[Claim 10] 10. The method of claim 9 wherein the automated response is performed by the action performing device.

[Claim 11] 11. The method of claim 9 wherein the action performing device is selected from the group consisting of a blowout preventor, a drilling fluid pump, and an alarm.

[Claim 12] 12. The method of claim 9 wherein the action performing device is located on the downhole tool string, in a well bore, or mounted on a drilling rig.

[Claim 13] 13. An apparatus for responding to an anomalous change in downhole pressure in a bore hole , comprising:

 a segmented electromagnetic transmission path integrated into the tool string;

the segmented electromagnetic transmission path adapted to communicate with one or more receivers spaced along the tool string;
at least one downhole sensor in communication with the segmented electromagnetic transmission path;
the receiver being in communication with the sensor via the electromagnetic transmission path, wherein
the anomalous change in downhole pressure is detected at a first location along the tool string and an automated response is actuated at a second location along the drill string.

[Claim 14] 14. The apparatus of claim 13 wherein the electromagnetic transmission path comprises inductive couplers.

[Claim 15] 15. The apparatus of claim 13 wherein the anomalous change in downhole pressure is selected from the group consisting of a pressure kick, a blowout, and loss of circulation.

[Claim 16] 16. The apparatus of claim 13 wherein the at least one receiver is selected from the group consisting of a blowout preventor, a drilling fluid flow regulator, a computer, a router, a node, an actuator, and an alarm.

[Claim 17] 17. The apparatus of claim 13 further comprising at least one action performing device selected from the group consisting of a blowout preventor, a drilling fluid flow regulator, and an alarm.

[Claim 18] 18. The apparatus of claim 17 wherein the at least one receiver is adapted to actuate the action performing device.

[Claim 19] 19. The apparatus of claim 17 wherein the action performing device is located on the downhole tool string, in a well bore, near a well bore, or mounted on a drilling rig.

[Claim 20] 20. The apparatus of claim 13 wherein the at least one pressure sensor is selected from the group consisting of a node, an integrated tool, a non-integrated tool, and a bottom-hole assembly.

[Claim 21] 21. The apparatus of claim 13 wherein the at least one pressure sensor is located near the bottom of the downhole tool string.

[Claim 22] 22. The apparatus of claim 13 wherein the automated response is selected from the group consisting of actuating a blowout preventor, adjusting the flow of drilling fluid, and broadcasting an alarm.

[Claim 23] 23. The apparatus of claim 22 wherein the blowout preventor is selected from the group consisting of a ram-type blowout preventor, an annular blowout preventor, a coiled tubing blowout preventor, and a spherical blowout preventor.